EDITORIAL ARTICLES.

CINNAMIC ACID IN THE TREATMENT OF TUBERCULOSIS.

THE failure of the tuberculin of Koch to satisfy the highest expectations has not deterred investigators from continuing to seek for remedies with which to combat tuberculous diseases. The results which have been obtained with cinnamic acid entitle it to a rank among the anti-tuberculous remedies. An instructive series of experiments with this drug have been carried out by Dr. Paul Richter in the private clinic of Prof. Landerer, in Leipzig.[1]

The experiments were conducted with ten rabbits as nearly alike as possible. These were injected in the veins of the ear with a fresh pure culture of tubercle bacilli dissolved in normal salt solution. On the eleventh day the first animal died. Post-mortem examination showed no gross tuberculous changes. A second animal died on the thirteenth day with a moderate number of tubercular nodules in the lungs. On the nineteenth day a third died with extensive tubercular deposits in the lungs and a few nodules in the liver; the spleen was not involved. From this time on treatment of six of the remaining rabbits was begun, it being assumed that these were suffering from tuberculosis. One was reserved as a control animal.

The same 5 per cent. emulsion of cinnamylic acid was employed as Landerer used on human subjects. In the beginning intra-venous injections of 0.1 to 0.2 grammes three times a week were made. After the third week the dose was gradually increased until 1.0 gramme was

[1] Histologische Untersuchungen über die Einwirkung der Zimmtsäuer auf tuberculöse Kaninchen. Virchow's Archiv. für Path., Anat. u. Phys. u. für klin. Medicin. Band CXXXIII, 1893.

reached. The amount was then reduced till finally 0.5 grammes was administered twice a week. This treatment was continued for six months.

After the infection the animals became greatly emaciated, and also during the beginning of the treatment showed little inclination to take food. They bore the injections well, and soon began to increase in weight. Two animals died spontaneously—one, very weak and emaciated, nineteen days after the beginning of treatment; and the second died of acute pneumonia in the seventh month. The rest of the animals had to be killed with chloroform. The untreated control rabbit died relatively late, living seven months after the injection. It would not be right to conclude that the original infection was not severe enough, for two of the animals died within nineteen days with pronounced tubercular deposits. A lack of uniformity in the course of the disease in the various animals cannot be prevented, for the number of bacteria injected into each animal could not be accurately regulated.

A thorough macroscopic and microscopic examination of these animals, treated with cinnamylic acid, shows as follows: First, an inflammatory area surrounds each tubercle, chiefly associated with capillary dilatation, extravasation of serum and local leucocytosis. Later, the nodule becomes surrounded by a wall of leucocytes, and at the same time multinuclear leucocytes begin to wander into the tubercle, and new blood-vessels are formed.

In a later period the tubercle is observed to be surrounded by a wall of young connective tissue, and at the same time a growth of connective tissue and blood-vessels into the tubercle takes place. Bacilli almost entirely disappear in this period. Finally this connective tissue becomes converted into cicatricial tissue, and shrinking occurs. Bacilli are now no longer present; and the animals during this time were well and regaining their lost flesh.

In the later stages of the disease the large tuberculous deposits cause the same changes as occur in the well-known processes observed in connection with necrotic areas and foreign bodies, which become encapsulated and penetrated by connective tissue.

From the above it will be seen that inoculation tuberculosis becomes much protracted when treated by injections of cinnamic acid. Treatment capable of keeping alive tuberculous rabbits for almost a year had before this not been known. Kitasato[1] stated in his observations with tuberculin, that he was able to keep alive for eleven weeks tuberculous guinea pigs, and regarded this as an evidence of the curative property of this tuberculin treatment.

The changes occurring in tuberculous animals, treated with cinnamic acid injections, is peculiar. Instead of the usual picture of numerous breaking down and cheesy nodules, with many bacilli, but few nodules are discovered, with a constantly diminishing number of bacilli, till finally staining fails to disclose a bacillus. Instead of the tendency to cheesy degeneration the nodules tend to become dense and fibrous. The fact that but little infection was found in the abdominal organs of these animals, depends not on the treatment, but on the manner of inoculation. Whereas guinea pigs are usually inoculated subcutaneously or intra-peritoneally, these rabbits were inoculated in the veins of the ear. With the latter, therefore, the first large viscus in which the bacteria become lodged is the lung, which so completely sieves out the bacilli from the blood that few or none reach the other organs.

The macroscopic and microscopic findings in the above cases very closely resemble the conditions described by Prudden, Hodenpyl and Vissmann, as occurring after the intra-venous injection of dead tubercle bacilli. The question arises as to whether, in the course of the treatment, a direct destruction of the tubercle bacilli is brought about by the action of the cinnamic acid. This seems not improbable, though the results obtained by Richter by experimenting with these substances in reagent glasses has been rather unsatisfactory.

Behring[2] discovered that cinnamon oil possessed marked antiseptic properties. The experiments which Richter has carried out with cinnamic acid, outside of the living animal body, fail to show

[1] Kitasato, Zeitschrift für Hygiene. Band XIII.

[2] Zeitschrift für Hygiene. Band V.

that the acid has any bactericidal action, and show that it hinders but slightly bacterial development. Experiments with pure cultures of tubercle bacilli, which were kept a whole day in cinnamic acid, showed that, after subcutaneous injection, these cultures were capable of producing rapid, local and metastatic tuberculosis.

Just how this acid acts on the tuberculous process seems difficult to say. Necrotic changes within the tubercles thus acted upon are less marked than those in untreated animals. Calcareous degeneration is also absent. The action of the drug is confined chiefly to the periphery of the nodule. It sets up an inflammation in the peripheral zone of the nodule, which results in the formation of a firm incapsulation. Within this capsule vital processes are so diminished that probably the bacilli perish from this cause.

Both tuberculin and cinnamic acid excite an inflammation about tuberculous nodules. These two inflammatory processes are quite different. The first is a rapid and very active change, with the formation of a rich area of round cells about the nodules; the latter is a more quiet process, and results in a deposit of dense fibrous tissue, shutting off the nodule from the surrounding tissue like a foreign body.

The discoverer of the therapeutic value of cinnamic acid in tuberculosis, Professor Landerer,[1] of Leipzig, has issued a small work in which he gives the methods of administering the drug, which he has found after two and a half years' employment in his clinic to give the best results. The treatment is neither complicated nor dangerous.

The cinnamic acid used by him is prepared from storax. It is a perfectly colorless, coarsely crystalline powder. Under the microscope the crystals are seen to be rhombic in form. It is feebly soluble in cold water, but freely soluble in hot water, alcohol, and warm oil. It dissolves without color. A cinnamic acid which is not absolutely colorless in hot water or alcohol forms a poor emulsion, because after a short time it deposits a gritty sediment.

[1] Anweisung zur Behandlung der Tuberculose mit Zimmtsäuer, Leipzig, 1893.

The emulsion employed by Landerer is as follows:

℞.	Acidi cinnamylici subtil. pulverisati,	5 gm.
	Olei amygdal,	10 gm.
	Vitelli ovi,	num. 1.
	Sol. natr. chlor. (0.7 per cent.) q. s.	
	ut fiat emulsio,	100 gm.

The preparation of this emulsion is important. The acid should be ground fine in a mortar. A little almond oil is then added, and the trituration continued. The rest of the oil is then rubbed in, and the yolk of one egg added, and the whole mass thoroughly triturated. The .7 per cent. sodium chloride solution is then added drop by drop, while the mixture is constantly stirred, until a weight of 100 grammes has been reached. The whole process should consume at least ten minutes. This mixture after standing a few days should remain homogeneous, and should deposit no crystals of cinnamic acid. If the emulsion does separate in the course of time it is still good. In the acid emulsion the crystals can still be seen under the microscope. They should not be larger than four times the diameter of a white blood corpuscle. Larger fat drops should not be present.

For alkalizing the emulsion a 7.5 per cent. solution of sodium hydrate is used. About five drops of this are added to the cubic centimetre of emulsion. It is important that the emulsion be made alkaline. A slight excess of alkali does no harm. The microscope should reveal no crystals in the alkaline solution. The emulsion should be kept in a cool place, and a new lot prepared weekly, though it will keep two weeks or longer. It cannot be sterilized. The acid emulsion will keep for a long time, but the alkaline quickly spoils; it is best, therefore, to add the soda only to as much emulsion as is required at the time.

The technique of the injection is simple. A perfectly sterile Pravaz syringe is necessary. The needle should be fine and very sharp. Before using it should lie fifteen minutes in alcohol, and then be washed with salt solution.

An elastic band is placed about the upper arm as in venesection.

The skin overlying the cephalic vein is cleansed with ether. The alkalinity of the emulsion should now be tested. The vein being made to stand out prominently, the needle should be introduced as nearly parallel to it as possible, till the lumen of the vessel is penetrated. When the needle has entered the vein it will be felt that it is freely movable in a cavity; and the emulsion can now be slowly injected. No pain, or nothing more than a slight burning sensation, which disappears on removing the band, follows the intravenous injection. If the fluid does not enter the vein a swelling will be observed.

No symptoms should appear immediately after the injection. Depression is a sign of too large a dose. Allowance must, of course, be made for nervous persons.

Injections into the gluteal muscles are made, the same as mercurial injections, into the upper and posterior gluteal region, avoiding the ischiadic nerve and gluteal vessels. A very sharp needle is not necessary.

In the very acute pulmonary tuberculosis of young people, Landerer has found that little is to be hoped for in the use of cinnamic acid. Cases of chronic tuberculosis without pulmonary cavities give almost an absolutely good prognosis. He has succeeded in improving 66⅔ per cent. of cases with pulmonary excavation when there was no considerable degree of fever.

After the fifth or sixth injection the patient begins to have the subjective feeling of improvement. After the first few injections, many patients feel tired and depressed. This feeling should disappear at least by the third week. Sweating gradually diminishes, and the appetite improves. Expectoration gradually diminishes after the fifth or sixth week. When no cavities are present, the bacilli in the sputa begin to disappear by the fourth or sixth week.

The size of the dose must be regulated by the strength of the patient. The weaker the patient, and the more extensive the disease in the lung, so much smaller should the dose be. Under any circumstance the treatment should be begun with small doses. The dose

should never be rapidly increased. It is best to begin with less than 0.1 ccm., and slowly increase the dose up to 0.25 or 0.4 ccm. Especially strong patients may be given 0.8 or 0.9 ccm. In advanced cases the dose should be held at 0.1 or 0.15 ccm. If the patient complains of uneasiness, pain in the head or chest, the dose should be diminished.

Landerer usually gives two injections weekly; but the best results are obtained when 0.1 or 0.2 ccm. are given every second day. This treatment should be continued in cases of pulmonary tuberculosis not less than three months, or at least a month after the bacilli have disappeared from the sputum. Very advanced cases have to be treated with small doses for nine months or longer.

Laryngeal tuberculosis he treats by painting the parts with cinnamic acid and alcohol, 1 : 20, or better, the acid with glycerin, 1 : 20 or 1 : 10, in conjunction with intravenous injections.

Intestinal tuberculosis is very tractable to this treatment. Small daily doses are administered beginning with 0.05 ccm. and increasing to 0.3 or 0.5 ccm. This is continued till the diarrhœa and tenesmus ceases and the patient's appetite returns.

The results obtained in genito-urinary tuberculosis have shown but slight improvement in this class of cases, though none have been treated longer than six weeks.

Meningeal tuberculosis has been experimented upon in only one case. The patient was already comatose, and a single injection was found to have no effect.

In lymphatic tuberculosis gradual hardening and diminution in the size of the nodules was effected. Two cases of pronounced tuberculous mediastinal tumors, with disappearance of the radial pulse, were very greatly improved, all subjective symptoms disappearing. The cases were observed for one and a half and two years respectively. In cases of broken-down nodules it is, of course, recommended that the necrotic material be removed. The cinnamic acid injections hasten the healing and insure against recurrence. With children the gluteal injections are also to be employed in these cases.

In other surgical tuberculous processes local and gluteal injections are used.

The dose for gluteal injection varies from 0.1 ccm. to 1.0 ccm. Here also the dose should be at first small and gradually increased. Dispensary patients are injected every third or fourth day; hospital patients every second day, or even five or six times weekly.

The local injection in joint tuberculosis is made directly into the fungous mass. Injections may be made into the joint cavity if it is diseased. When necessary the needle may be passed down to or into the bone. Beginning with 0.1 ccm., the dose is gradually increased to 0.4 ccm. or 0.5 ccm.

Injections are made into fungous masses every second or fourth day, and during the intervals gluteal injection is practiced. Before an injection into a tuberculous swelling is repeated, any swelling or pain caused by the previous injection must have disappeared. The more normal a joint becomes, the more easily pain is excited by the injections. In the case of very sensitive persons Landerer recommends the injection of 4 per cent. solution of cocaine in bichloride solution 1 : 10,000. The above treatment can be carried out in connection with immobilization or extension apparatus.

Tuberculous abscesses are treated by Landerer by evacuating with the trocar, washing out with sterilized .7 per cent. salt solution and injecting with 5 ccm. to 30 ccm. of sterilized 1 : 20 or 1 : 10 cinnamic acid in glycerin. The opening is then closed with a suture. Neither fever nor pain follows this operation. If no sequestrum is present the cavity shrinks and becomes obliterated. The injection must sometimes be repeated. Sequestra and necrotic tissue must always be removed.

Tuberculous fistulæ are treated with cinnamic acid in alcohol, 1 : 20, or in glycerin, 1 : 10 or 1 : 20.

Landerer's method of treating lupus consists in injecting the nodules with cinnamic acid and alcohol, 1 : 20, and covering the lupous surface with balsam of Peru plaster. Hypertrophic lupus heals more quickly when first curetted and then treated with cinnamic

acid in the pure powder or cinnamic glycerin injections. The treatment of lupus by this method he has found to require a considerable period of time, but the results are eventually good and very little shrinking or scar contracture takes place. He has found the following preparation to be very satisfactory:

℞. Ac. cinnamylici
Cocaini hydrochlor., āā 1.0 gm.
Spir. rectif. ad., 20.0 gm.

During the last few months Landerer has been using, instead of the emulsion, a 5 per cent. watery solution of sodium cinnamate for intravenous injection. The clinical results are as good if not better than those obtained with the emulsion. The solution can be sterilized in the water bath before using. He continues to use the emulsion in surgical tuberculosis.

Out of eighteen unselected cases of internal tuberculosis treated by Landerer[1] with cinnamic acid injections, 50 per cent. recovered, 33.3 per cent. were improved and 11.1 per cent. died. The results obtained with twenty-three earlier cases of the same sort treated with balsam of Peru showed 26.1 per cent. cured, 17.4 per cent. improved, 8.7 per cent. unimproved and 47.8 per cent. died.

A later report of fifty unselected cases of internal tuberculosis treated by cinnamic emulsion shows the following result:[2]

Cured 29 . . . . . 58 per cent.
Improved 10 . . . . . 20 per cent.
Unimproved 1 . . . . . 2 per cent.
Died 10 . . . . . 20 per cent.

Of the improved, four ceased to take the treatment and were lost sight of. Four cases presenting themselves with cavities in the lung are among the cured. Of the ten fatal cases, six were of the very acute and rapid type; the others were very advanced and, from the beginning, hopeless cases.

He has reported ten cases of coxitis cured. In one of these was a large abscess, which was treated as above.

[1] Die Verhandlung der Tuberculose mit Zimmtsäuer, Leipzig, Vogel, 1892.

[2] Deutsch med. Wochenschrift, No. 9 u. 10, 1893.

Two cases of spondylitis are reported. One is healed. The second, in which a large abscess had formed, became able to walk without pain, but at the time of report still had a fistula.

Nineteen cases of knee tuberculosis are reported, all cured but three, which were improved at the time of report. One of these had suppurated, but was eventually cured. Another of the cured cases presented for treatment a very much enlarged joint.

Nineteen other cases of tuberculosis of the lower extremity gave the following results: Seventeen cases, some with sequestra and abscesses, are cured. Two are still in process of treatment.

Three cases with sequestra from the head of the humerus were cured with movable joints.

A large number of cases of bone and joint tuberculosis with equally good results are reported. So with lupus and lymphatic tuberculosis. In all, the reports cover 107 surgical cases.

Landerer regards the action of cinnamic acid as resembling somewhat that of creasote and guaiacol. It differs from creasote in that the patients treated with the latter soon come to a standstill in their improvement, and after a certain time the drug seems to have no further effect. Only four of these cases of internal tuberculosis had not been tried with creasote. Notwithstanding the large doses of the drug the disease had continued; but after the cinnamic acid treatment was instituted gradual improvement was observed. The same is said of guaiacol. Iodoform has given Landerer no great satisfaction in the treatment of surgical cases. Cinnamic acid is at least as efficacious, and does not give rise to the fever and pain which follow injections of iodoform.

JAMES P. WARBASSE.

ZÖLLER ON THE SURGICAL TREATMENT OF HYPOSPADIAS AND EPISPADIAS IN THE MALE.[1]

In the earlier times epispadias and hypospadias were treated only by palliative measures. When stenosis of the urethral opening

[1] Beiträge zur klinischen Chirurgie, XI Band, 1 Heft, 1894.

was present, it was treated with sounds or radiate incisions; and in cases of incontinence the patient was condemned to carry some receptacle for the dribbling urine. As surgical technique became perfected plastic operations for these defects were devised, and it is with these plastic operations that Zöller deals.

The operation of Dieffenbach[1] consisted in piercing the glans penis from its summit to the normal urethra, and allowing a canula to remain in this new opening till a lining of epithelium had formed. In the meantime the old urethral opening was closed. It was found that after this operation the new canal rapidly contracted, often becoming completely closed, so that sounds had to be passed very frequently to keep the lumen patent.

In higher grades of hypospadias the same indications must be met, and at the same time the organ must be restored as much as possible to its natural form. Here the conditions are much more complicated, and most surgeons incline to perform the operation in more than one stage.

Duplay[2] operated thus in three stages:

Stage I.—Median union of the freshened edges of the groove in the glans by interrupted and continuous sutures. When the groove is not deep enough, it is deepened by a median or two lateral incisions. To straighten the organ, when necessary, a transverse incision is made, and this then closed in the form of a cross or longitudinally.

Stage II.—For forming the urethra penis an incision is made on either side of the groove parallel to the median line, and met by a transverse incision at either end, thus marking out four quadrilateral flaps. The two inner are dissected up from without inwards, and the two outer from within outwards. These flaps must be so formed that the two inner are large enough to be united in the median line over a small sound in the urethral groove, and the two outer made to cover these. The two inner flaps are made as small as possible, and the two outer ones as large as possible.

[1] Dieffenbach, Operative Chirurg., Leipzig, 1845.

[2] Archiv gén. de med. Paris, 1874, Vol. I, p. 657; 1880, p. 257.

Stage III.—Uniting the newly-formed urethra with the hypospadic opening.

By this method Duplay was able to completely cure five cases.

J. Wood,[1] Gouley[2] and Michel[3] operated in much the same way, taking a skin flap from the under surface of the penis or from the scrotum, inverting it and fixing the edges to the borders of the urethral groove.

The methods of treating epispadias may be divided into two groups.

Group I.—Forming an urethra by uniting in the median line the freshened edges of the epispadic groove (Dieffenbach, Duplay, Krönlein).

Group II.—Plastic operations by means of flaps (Nélaton, Dolbeau, Thiersch).

Dieffenbach[4] succeeded in curing one case by means of the median suture. In another case he was not able to obtain anything like a satisfactory result.

Duplay operated, in three stages, very much as he did in hypospadias, except that he closed the canal by median suture of the edges. He obtained three good results: one case completely cured and two cases with fistulous openings,

Krönlein divided his operation into two stages: First, forming the urethra glandis after the method of Thiersch, and then closing in the urethra penis and the fistula by means of bringing together broadly freshened surfaces. He obtained a complete cure in a five-year-old boy.

The first operation for the cure of epispadias by means of flaps was undertaken hy Nélaton in 1852, and later by Dolbeau. A long quadrangular skin-flap, with its attached end just at the fistula, was taken from the belly, turned down so as to cover in the urethral

[1] Med. Times and Gaz., 1875, January 30.

[2] New York Med. Record, 1876, February 19.

[3] J. Courvoisier, Quelques considérations sur l'operation d. l'hyposp., Strassburg, 1869.

[4] Dieffenbach, Operat. Chirurg., Band 1, page 544.

groove, and sutured by its edges to a small flap running along on either side of the borders of the groove. Then two curved incisions, with their concavities upwards, were carried across the front of the scrotum. Between these a bridge of skin was dissected up, and the penis drawn beneath this bridge. In this manner the wound surface of the flap from the belly was opposed against the wound surface of the scrotal bridge. The edges of the wounds were then united by suture. A catheter was left in until union was firm.

Dolbeau operated upon three cases. The treatment lasted three months before a cure was effected, several operations being necessary.

Thiersch divided his method into five stages:

Stage I.—Establishment of a perineal urinary fistula to carry the urine away from the seat of operation.

Stage II.—Closing the groove in the glans penis. On either side of the groove a longitudinal incision is made converging at an acute angle toward the median line, and involving three-fourths of the thickness of the glans, so that the latter is divided into two lateral flaps and a median wedge. The outer borders of the groove are then freshened, and the two lateral flaps are drawn over the median wedge and sutured by their freshened borders.

Stage III.—Converting the penile groove into a canal. On either side of the channel a quadrilateral flap is dissected up in such a way that on one side the base or attachment is internally and on the other side the base is externally from the median line. The first flap is then turned over with its epidermis surface posteriorly; the second flap is carried over the first in such a manner that raw surface lies upon raw surface. These are held in place by interrupted sutures.

Stage IV.—For covering in the defect between the new urethra glandis and urethra penis the anterior half of the prepuce is employed. A fenestrum is cut through the whole thickness of the foreskin, the edges of the opening between the two canals are freshened, and then the glans is introduced through the fenestrum in the prepuce, and the edges of the separated layers of the prepuce are

fixed to the edges of the urethral opening. The divided edges of the posterior portion of the prepuce are then sutured.

Stage V.—Closing of the old meatus is accomplished by means of two skin flaps taken from the belly. One is a triangular flap with the base just above the opening. This is turned down and its edges sutured to the freshened edges of the opening. The other flap is taken from the lower anterior abdominal wall and turned down to cover the above, wound surface to wound surface.

Thiersch reckons on four months for accomplishing this operation.

The advantages of this method are very evident. Subsequent formation of fistulæ is prevented, because the suture lines do not lie one over another, but the deeper ones are covered by skin flaps which are sutured laterally. It has the advantage over the method of Dolbeau that the organ is restored to the most possibly normal form. Excellent results with this operation have been reported by Lücke,[1] T. Pick[2] and Gussenbauer.[3]

More recently Rosenberg[4] has devised a method by which, after covering in the groove, the penis is allowed to heal fast to the abdominal wall, in order to facilitate subsequent operation. Landerer practised the same, excepting that he made the scrotal skin to grow fast to the penis.

During the years from 1878 to 1892 inclusive, twenty cases were operated on in Professor Czerny's surgical clinic. The cases were as follows:

Hypospadias of the first degree	8
" " second "	4
" " third "	2
	14

[1] VI Kongress der Deut. Gesell. für Chirurg., p. 142.

[2] Lancet, 1870, Nov. 15, p. 726.

[3] Wiener Med. Wochenschr., 1886, No. 13, p. 467.

[4] Deutsche med. Wochenschr., 1891, p. 477.

[5] Deutsche Zeitschr. für Chirurgie, 1891.

Epispadias of the first degree	0
" " second "	4
" " third "	2
	6

The ages varied between twenty-two months and twenty-nine years. The anomaly was congenital in all cases excepting two, in which it followed the operation of ritual circumcision. In some cases the defect gave rise to no symptoms; in others it was associated with pronounced disturbances, such as retention and incontinence of urine and sexual impotence.

The methods employed in these cases are given below, the parenthetic figures standing for the number of after-operations included in the first number:

I. METHOD OF THIERSCH.

For forming the glans canal	10 (2) operations.
" " " penile "	4 (2) "
" the closing of fistulæ	7 (3) "
	21 (7) "

II. MEDIAN SUTURING OF THE FRESHENED BORDERS.

For forming the glans canal	6 (1) operations.
" " " penile "	3 (2) "
" the closing of fistulæ	12 (2) "
	21 (5) "

III. METHOD OF KRÖNLEIN.

For forming the glans canal	2 (1) operations.
" the closing of a fistula	1 "
	3 (1) "

IV. METHOD OF DUPLAY.

For straightening the organ	2 operations.
" forming the urinary canal	1 (1) "
	3 (1) "

V. METHOD OF DIEFFENBACH.

Perforatio glandis	1 operation.

In some cases somewhat modified procedures were employed. In one case, besides the median suturing of the edges of the glans

groove, the whole line was covered in with prepuce, and a good result obtained.

In two other cases the double Lembert suture was employed to close a fistula and an imperfect urethra. The skin about the fistula was dissected up like a collar, and flaps were loosened up along the sides of the groove. These borders were turned in and sutured, and then a second row of sutures was made to unite the peripheral tissues over this. Both results were imperfect.

The entire number of operations performed on these cases was fifty-two, of which number fifteen (29 per cent.) were after-operations. Treatment of minute fistulæ with pure hydrochloric acid or with the actual cautery is not included with these operations.

As suture material silver wire was first employed, but of late catgut and silkworm-gut has been largely used. Silver and silkworm-gut are least acted upon by the urine. Catgut serves best for buried sutures. With the exception of the cases in which a place for the escape of urine existed above the seat of operation, a permanent catheter was always introduced into the newly-covered canal. After the closure of fistulæ, it sufficed to have the patient urinate in a sitz bath.

The duration of treatment varied between one and five months, and in the cases which were cured three to four months were consumed.

The results of treatment are reported as follows:

Completely cured	7 cases.
Healed with incontinence	1 "
" " fistulæ	10 "
Without result	2 "

The percentage of cures (35 per cent.) would have been much greater had the patients who were discharged with fistulæ been subjected to still further operative treatment.

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